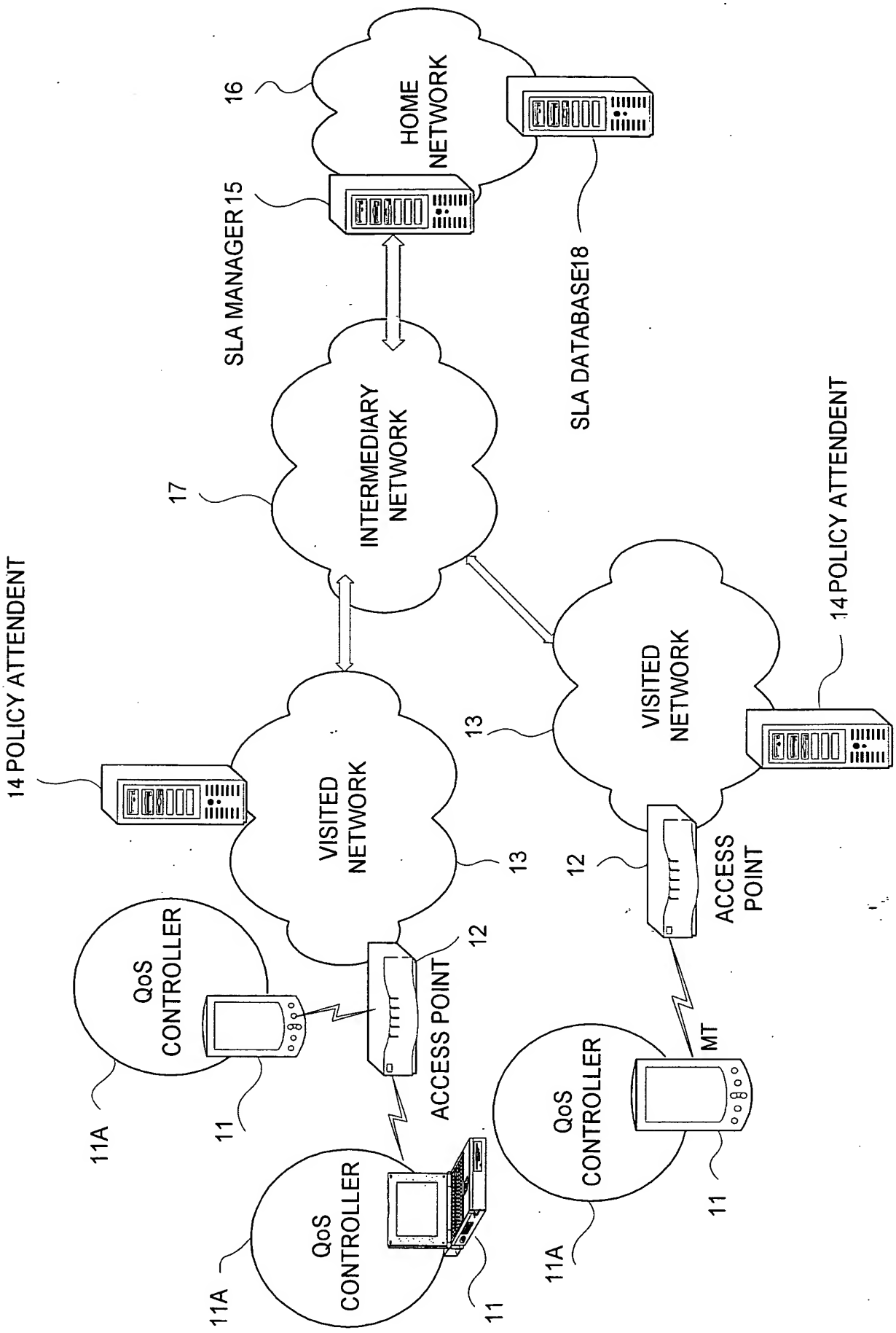
FIG. 1


HOME NETWORK
16
SLA MANAGER15
SLA DATABASE18
INTERMEDIARY NETWORK
17
14 POLICY ATTENDENT
VISITED NETWORK
13
14 POLICY ATTENDENT
VISITED NETWORK
13
12
ACCESS POINT
QoS CONTROLLER
11A
11
12
ACCESS POINT
MT
QoS CONTROLLER
11A
11
QoS CONTROLLER
11A
11

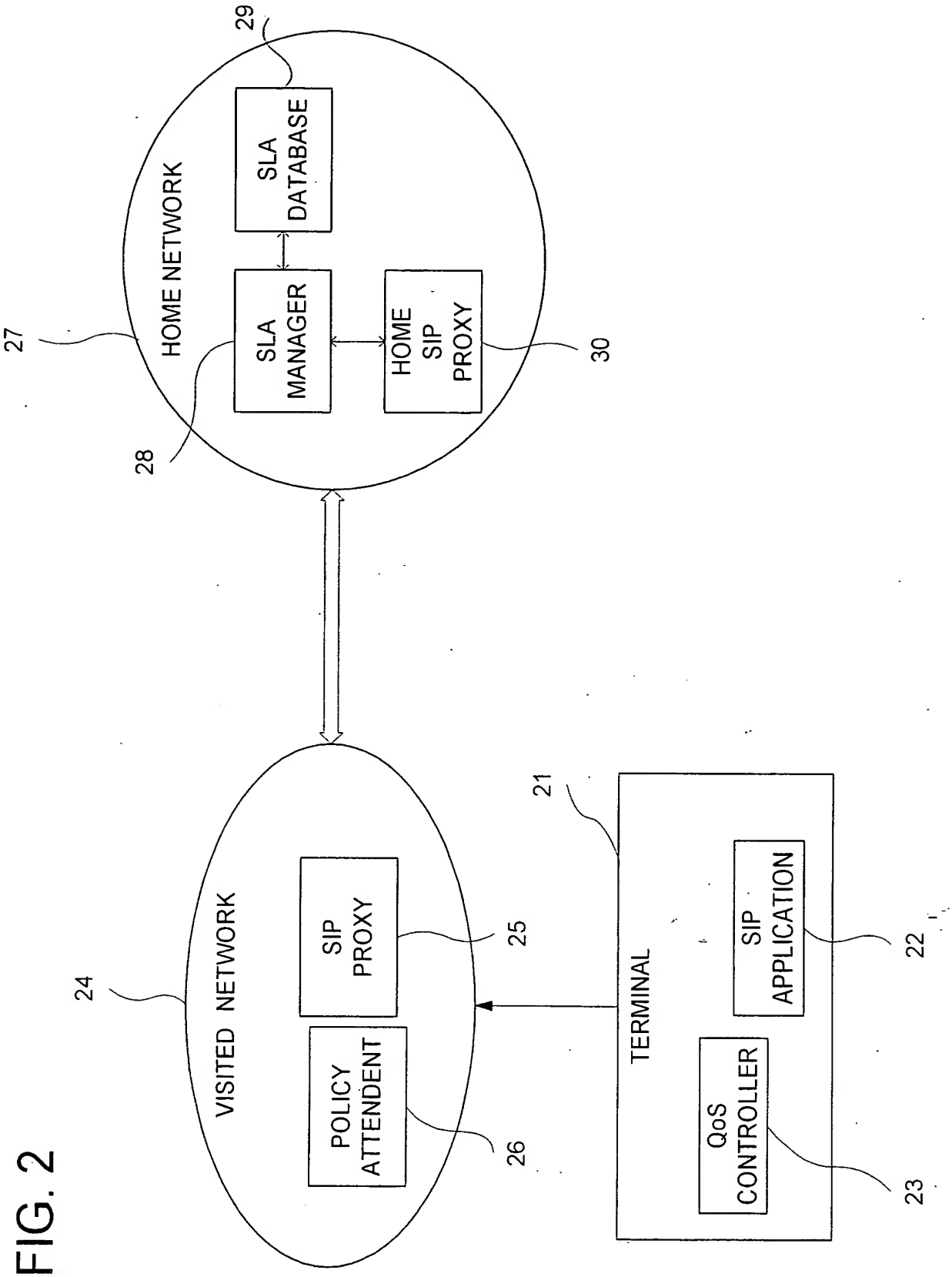
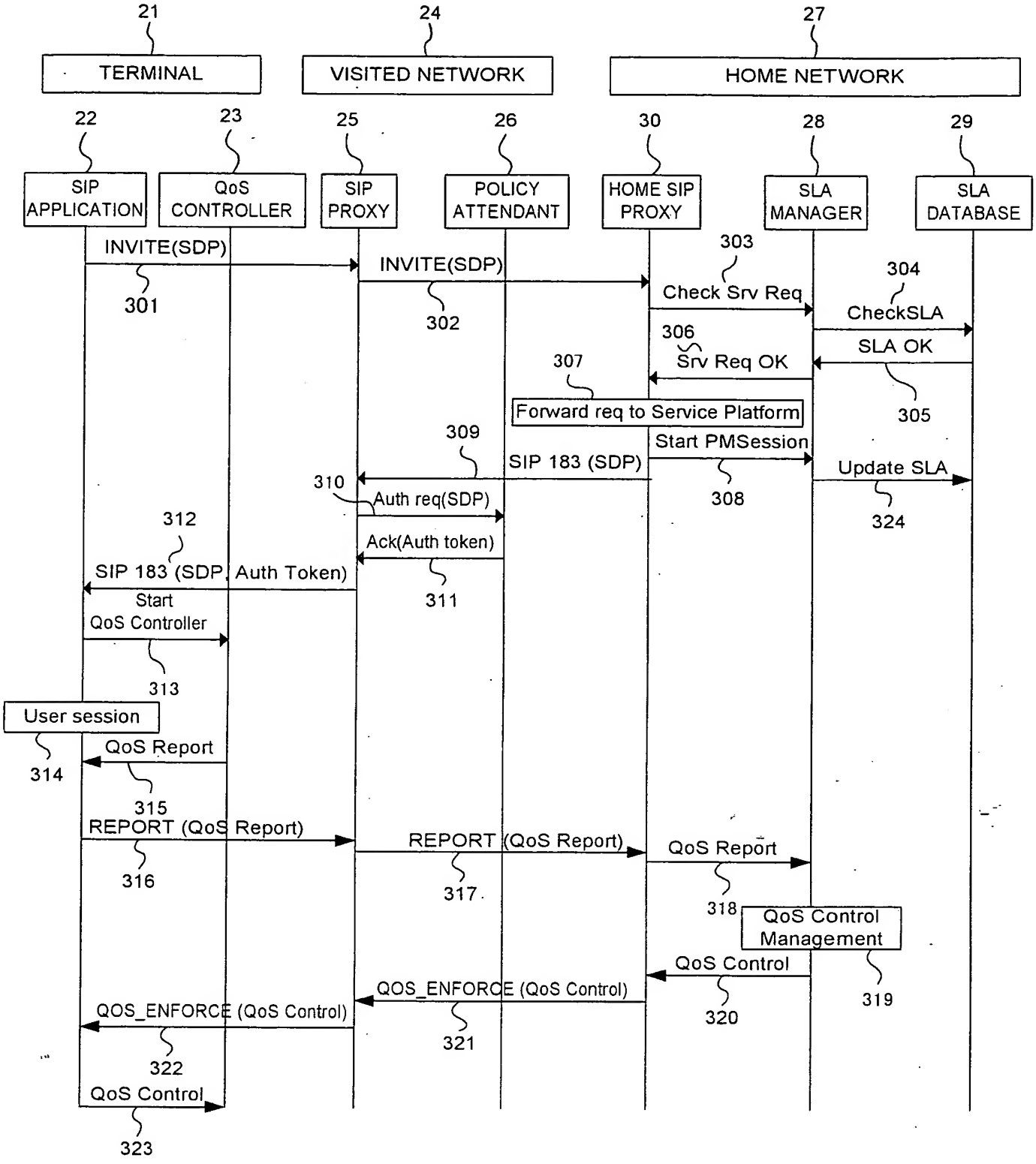

HOME NETWORK
SLA DATABASE
SLA MANAGER
HOME SIP PROXY
VISITED NETWORK
SIP PROXY
POLICY ATTENDENT
TERMINAL
SIP APPLICATION
QoS CONTROLLER
21
22
23
24
25
26
27
28
29
30

FIG. 2

FIG. 3


21
24
27
TERMINAL
VISITED NETWORK
HOME NETWORK
22
23
25
26
30
28
29
SIP APPLICATION
QoS CONTROLLER
SIP PROXY
POLICY ATTENDANT
HOME SIP PROXY
SLA MANAGER
SLA DATABASE
INVITE(SDP)
301
INVITE(SDP)
302
303
Check Srv Req
304
CheckSLA
306
Srv Req OK
SLA OK
305
307
Forward req to Service Platform
309
Start PMSession
SIP 183 (SDP)
308
Update SLA
324
310
Auth req(SDP)
312
Ack(Auth token)
SIP 183 (SDP, Auth Token)
311
Start QoS Controller
313
User session
314
QoS Report
315
REPORT (QoS Report)
316
REPORT (QoS Report)
317
QoS Report
318
QoS Control Management
319
QoS Control
320
QOS_ENFORCE (QoS Control)
321
QOS_ENFORCE (QoS Control)
322
QoS Control
323

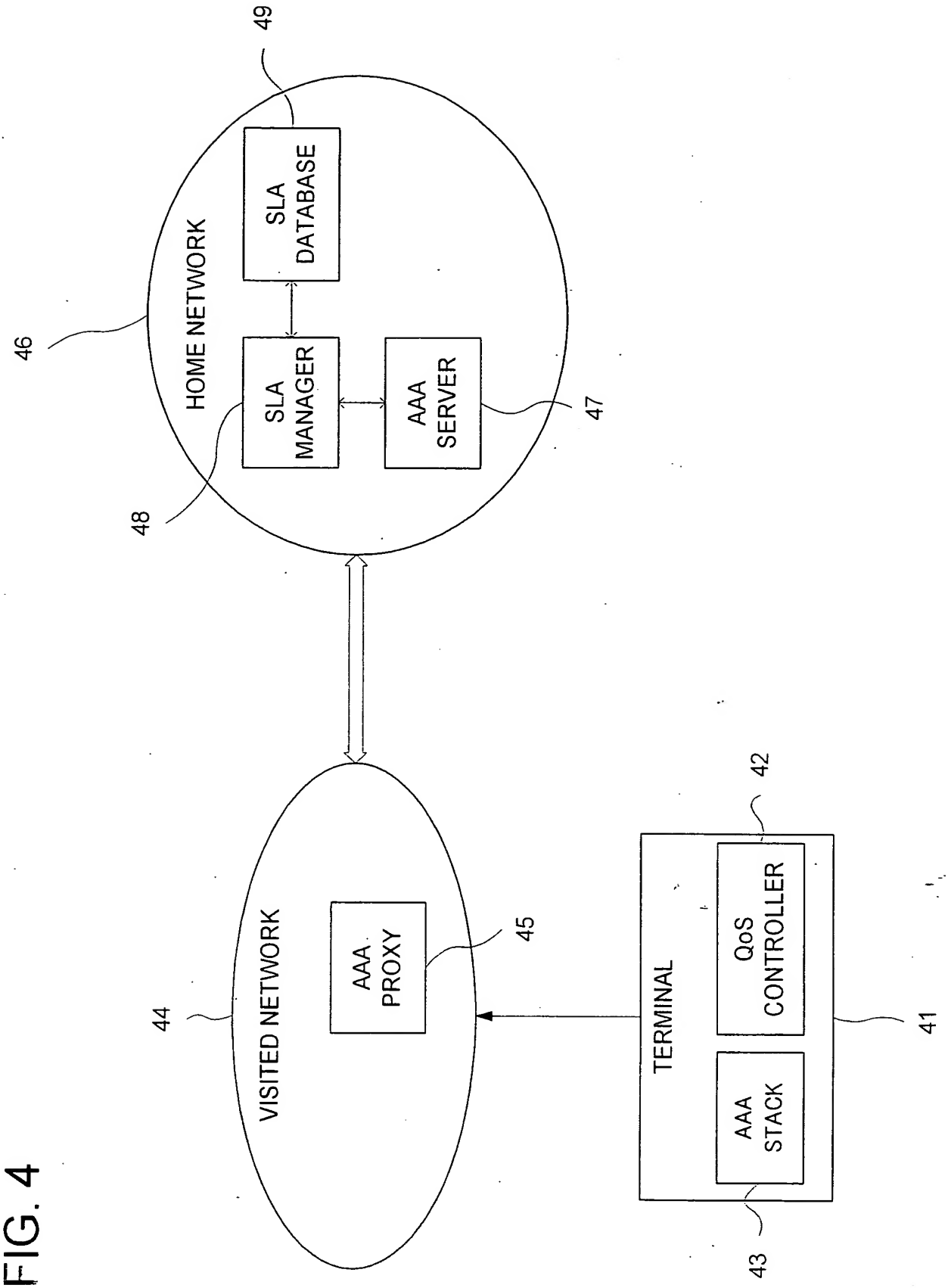

49
SLA DATABASE
HOME NETWORK
46
SLA MANAGER
AAA SERVER
47
48
VISITED NETWORK
44
AAA PROXY
45
TERMINAL
42
QoS CONTROLLER
41
AAA STACK
43

FIG. 4

FIG. 5

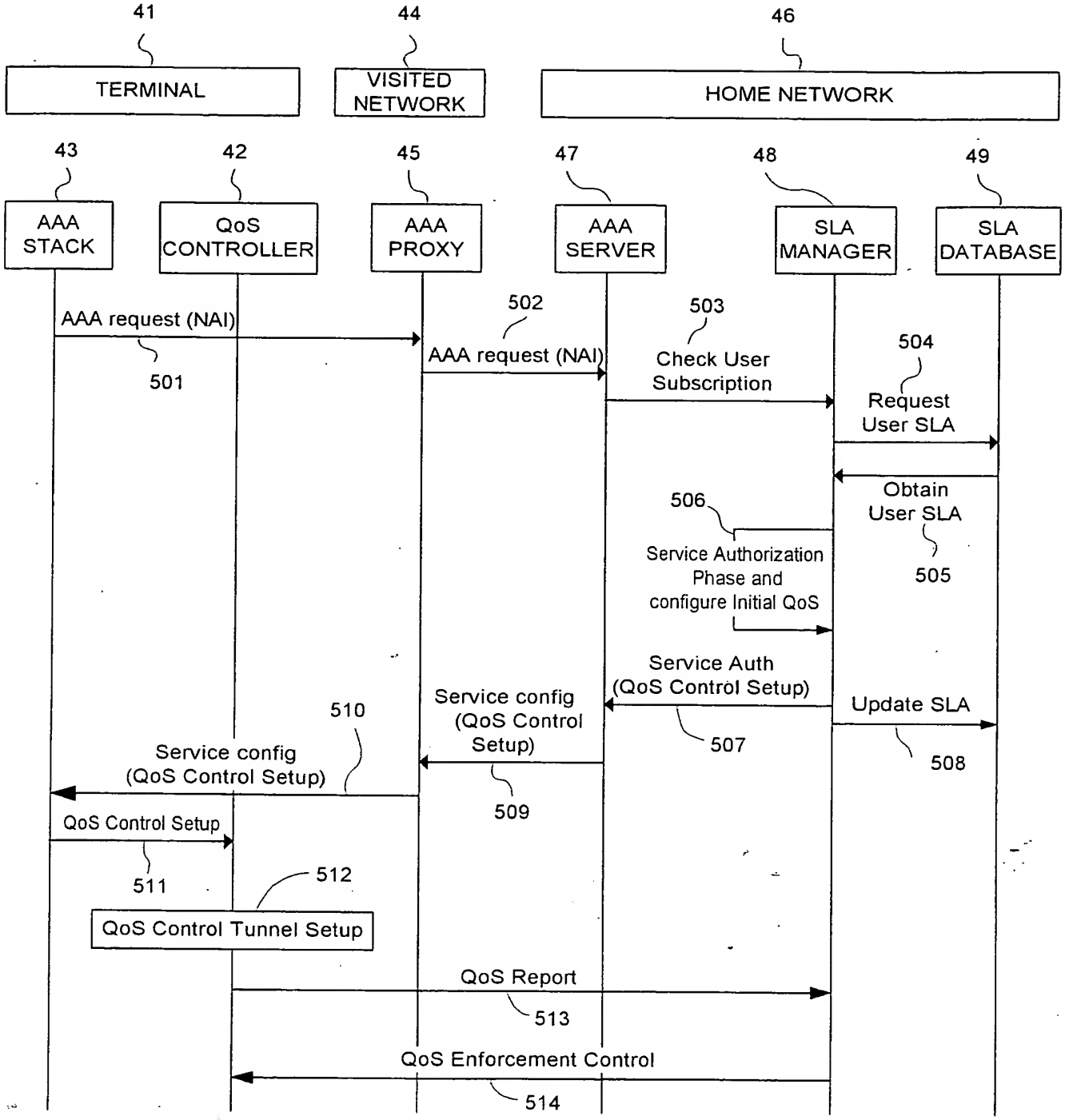

41
44
46
TERMINAL
VISITED NETWORK
HOME NETWORK
43
42
45
47
48
49
AAA STACK
QoS CONTROLLER
AAA PROXY
AAA SERVER
SLA MANAGER
SLA DATABASE
AAA request (NAI)
501
502
AAA request (NAI)
503
Check User Subscription
504
Request User SLA
Obtain User SLA
505
506
Service Authorization Phase and configure Initial QoS
Service Auth (QoS Control Setup)
507
Update SLA
508
Service config (QoS Control Setup)
509
510
Service config (QoS Control Setup)
QoS Control Setup
511
512
QoS Control Tunnel Setup
QoS Report
513
QoS Enforcement Control
514

FIG. 6

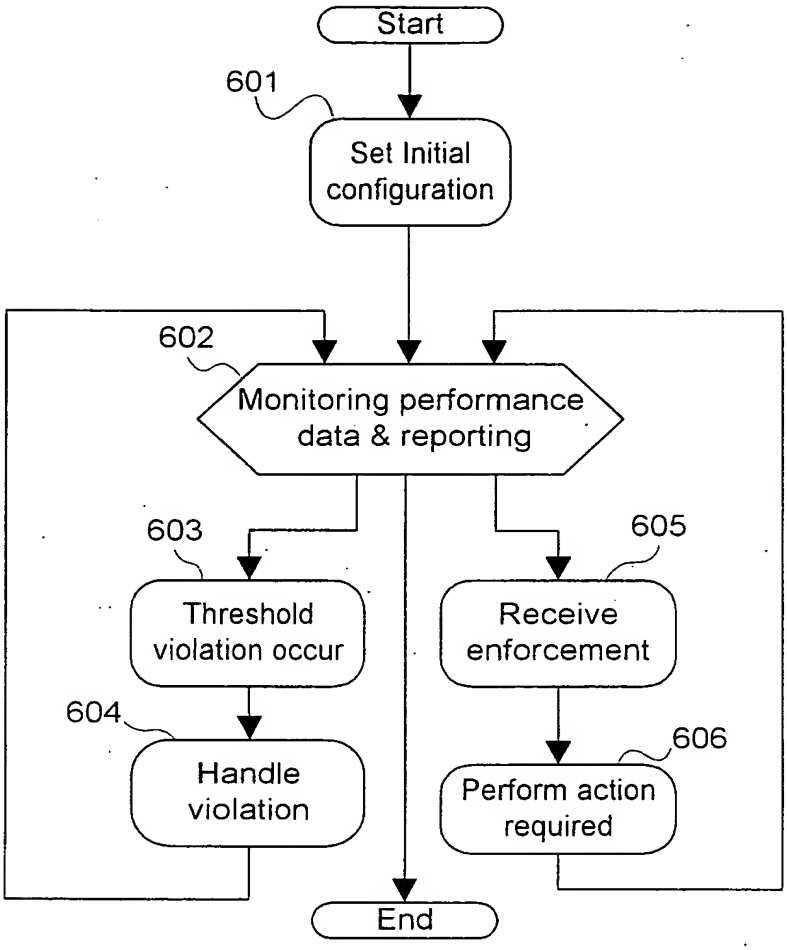

Start
601
Set Initial configuration
602
Monitoring performance data & reporting
603
Threshold violation occur
604
Handle violation
605
Receive enforcement
606
Perform action required
End

FIG. 7

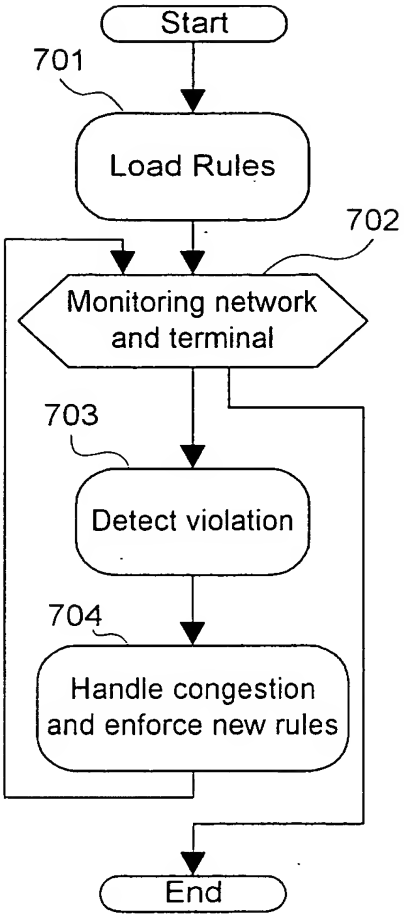

Start
701
Load Rules
702
Monitoring network and terminal
703
Detect violation
704
Handle congestion and enforce new rules
End

FIG. 8

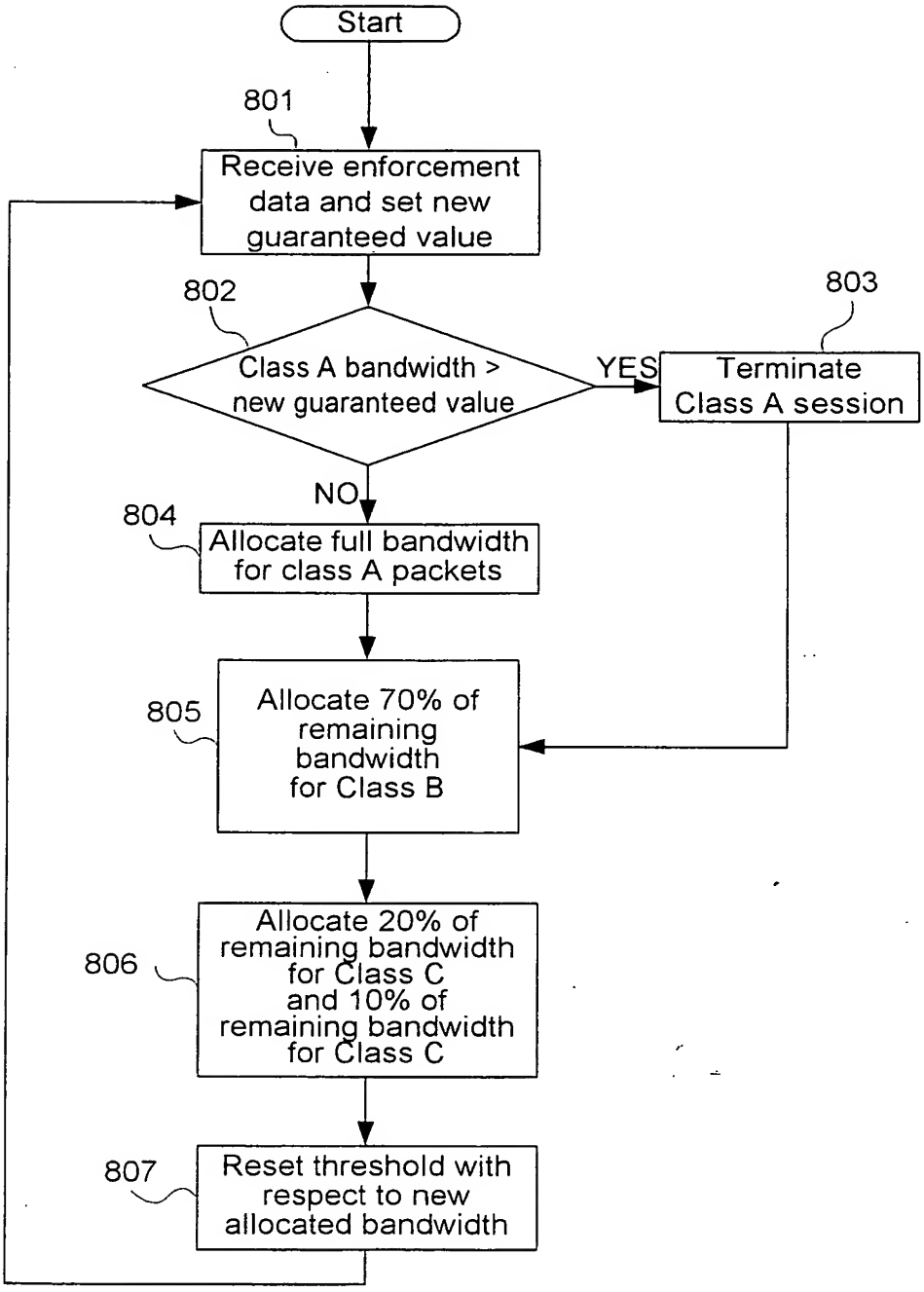

Start
801
Receive enforcement data and set new guaranteed value
802
Class A bandwidth > new guaranteed value
YES
803
Terminate Class A session
NO
804
Allocate full bandwidth for class A packets
805
Allocate 70% of remaining bandwidth for Class B
806
Allocate 20% of remaining bandwidth for Class C and 10% of remaining bandwidth for Class C
807
Reset threshold with respect to new allocated bandwidth

FIG. 9

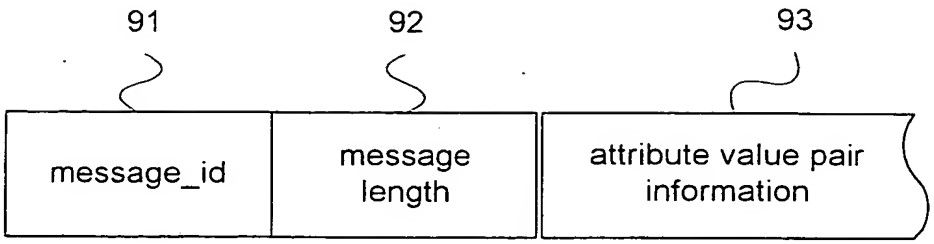
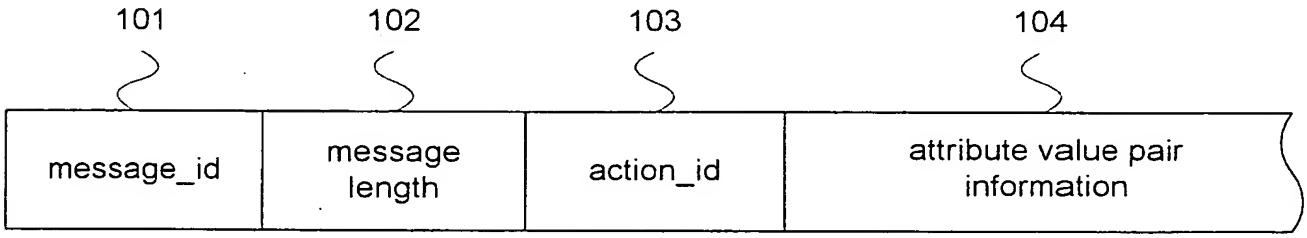

91
92
93
message_id
message length
attribute value pair information

FIG. 10


101
102
103
104
message_id
message length
action_id
attribute value pair information

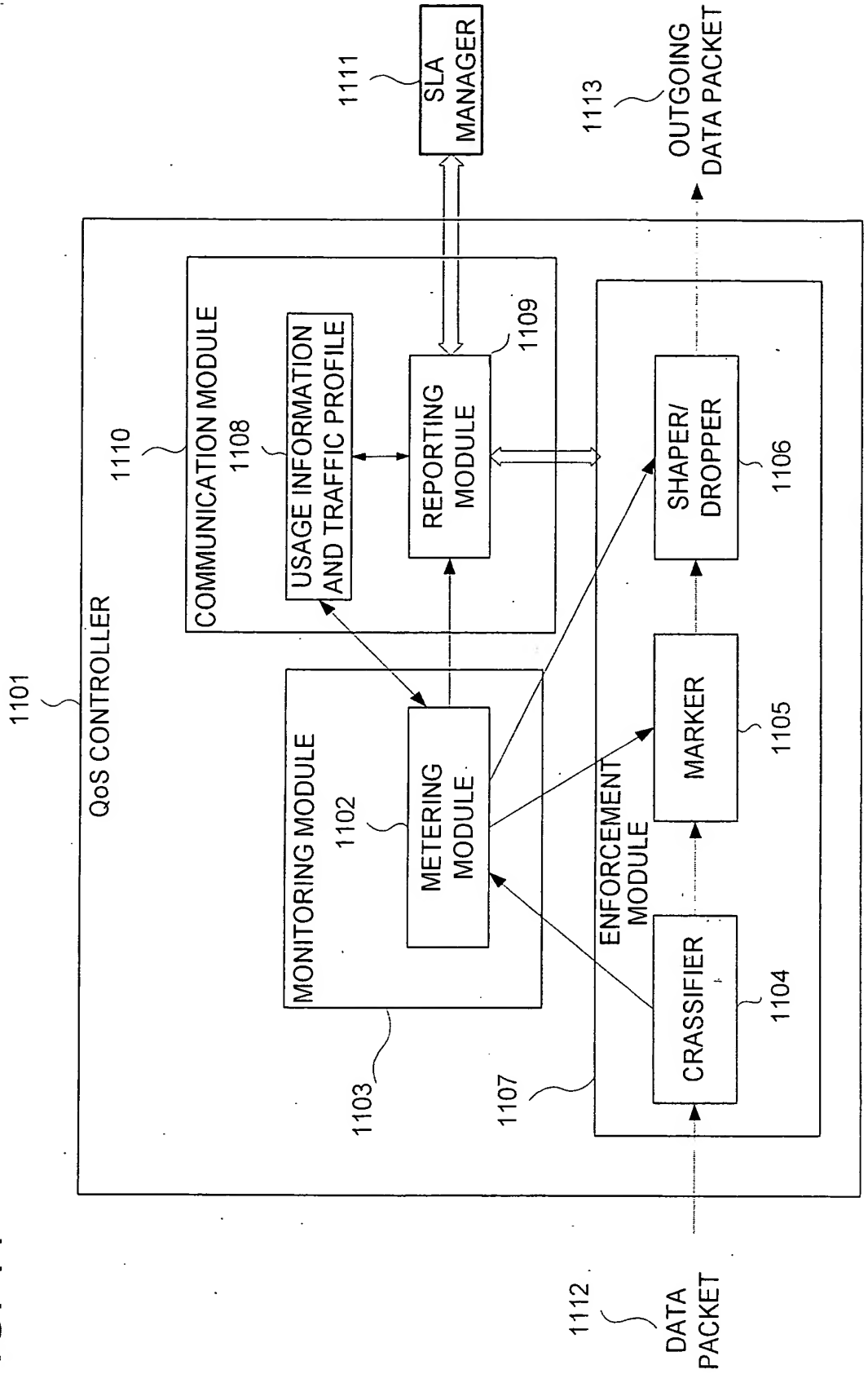

1111
SLA MANAGER
1113
OUTGOING DATA PACKET
1101
QoS CONTROLLER
1110
COMMUNICATION MODULE
1108
USAGE INFORMATION AND TRAFFIC PROFILE
1109
REPORTING MODULE
SHAPER/ DROPPER
1106
MONITORING MODULE
1102
METERING MODULE
ENFORCEMENT MODULE
MARKER
1105
CRASSIFIER
1104
1103
1107
1112
DATA PACKET

FIG. 11

FIG. 12

Action_id	Action_id description	Number of Parameters	QoS Parameters
1	Add_ bandwidth	1	Amount of bandwidth to be increased from existing one
2	Decrease bandwidth	1	Amount of bandwidth to be decreased from existing one
3	New bandwidth	1	Use the new allocated bandwidth.
4	Stop new request	0	Nil
5	Resume new request	0	Nil
6	Suspend all tranmission session	0	Nil
7	Suspend all receiving session	0	Nil
8	Suspend all sessions	0	Nil
9	Terminate all sessions	0	Nil
10	Set Bandwidth Allocation for each class	4	% for Class1 % for Class2 % for Class3 % for Class4 (assumption of 4 classes being used for QoS management)
11	Set Drop threshold	4	% for Class1 % for Class2 % for Class3 % for Class4 (assumption of 4 classes being used for QoS management)
12	Generate report_periodically and notify server	3	Report id period to generate report period unit (e.g. day, hour, minute, second)
13	Generate report this instance and notify server	1	Report_id
12	Stop report generation	0	Nil